

1/26

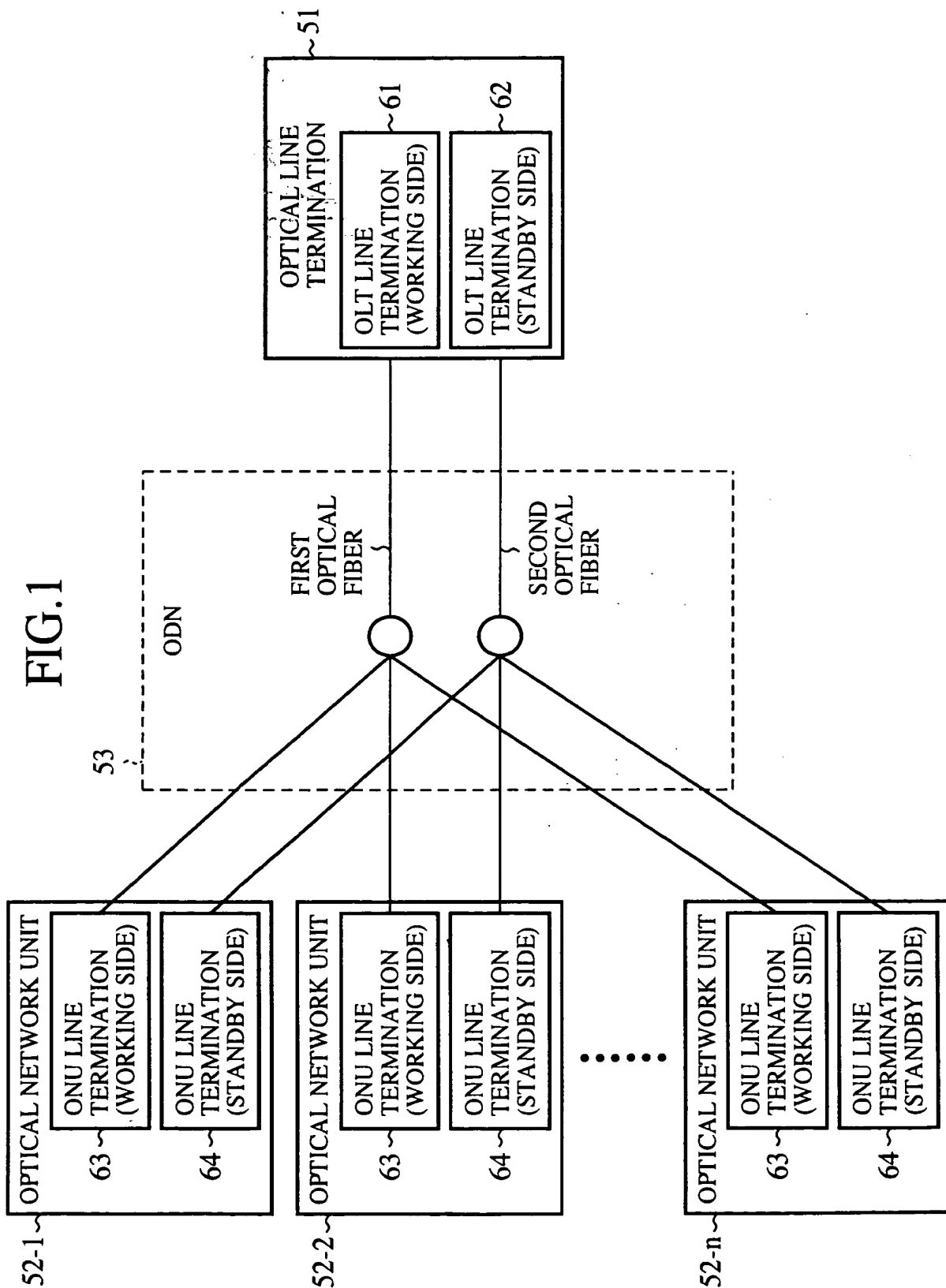


FIG. 1

2/26

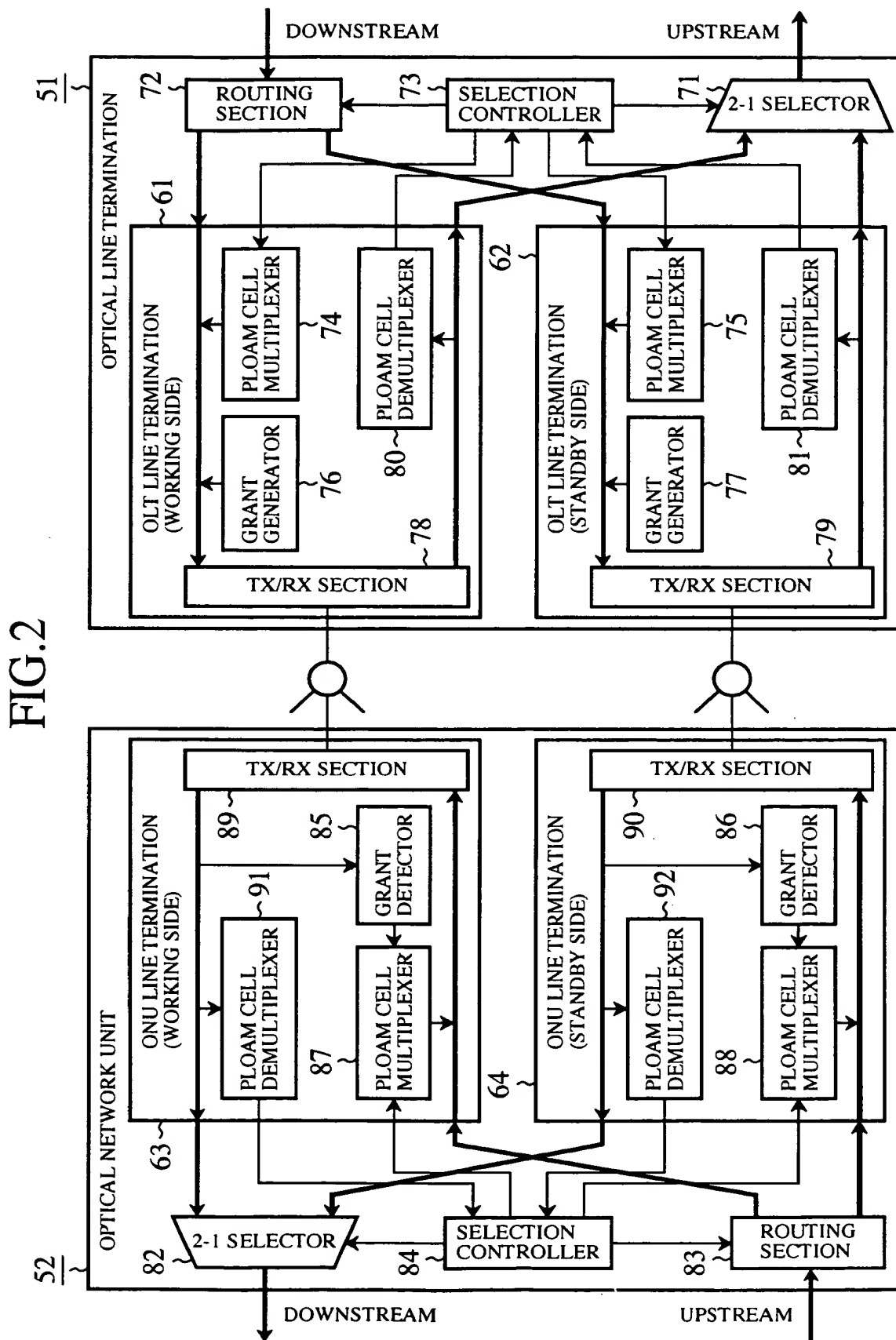


FIG.2

FIG. 2

FIG.3

CONTROL EXAMPLE (NON-REVERTIVE MODE)

FAULT STATE	ONU TO OLT		OLT TO ONU		OPERATION	
	K1 BYTE	K2 BYTE	K1 BYTE	K2 BYTE	ONU	OLT
NO FAILURE	NO SW REQ.	(ONU IS) SELECTING WS	NO SW REQ.	(OLT IS) SELECTING WS	SL IS OPERATING IN WS	SL IS WORKING AT WS
EQUIPMENT FAILURE OCCURS IN WS TX/RX OF ONU	SW REQ. BY WORKING SF	(ONU IS) SELECTING WS	NO SW REQ.	(OLT IS) SELECTING WS	DETECT SW REQ. BY WORKING SF; SL IS WORKING AT WS; UPDATE T-K1 BYTE	SL IS WORKING AT WS
	SW REQ. BY WORKING SF	(ONU IS) SELECTING WS	NO SW REQ.	(OLT IS) SELECTING SS	DETECT SW REQ. BY WORKING SF; SL IS WORKING AT WS; UPDATE T-K1 BYTE	DETECT RR BY RECEIVING K1/K2; SL IS SWITCHED TO SS; UPDATE T-K2 BYTE
	SW REQ. BY WORKING SF	(ONU IS) SELECTING SS	NO SW REQ.	(OLT IS) SELECTING SS	DETECT RR BY RECEIVING K2; SL IS SWITCHED TO SS; UPDATE T-K2 BYTE	DETECT RR BY RECEIVING K1/K2; SL IS SWITCHED TO SS; UPDATE T-K2 BYTE
EQUIPMENT FAILURE IS RESTORED IN WS TX/RX OF ONU	DO NOT REVERT TO WS	(ONU IS) SELECTING SS	NO SW REQ.	(OLT IS) SELECTING SS	DETECT SW REQ. CLEAR; DO NOT REVERT STATE; UPDATE T-K1 BYTE	DETECT RR BY RECEIVING K1/K2; SL IS SWITCHED TO SS; UPDATE T-K2 BYTE
	SW REQ. BY STANDBY SD	(ONU IS) SELECTING SS	NO SW REQ.	(OLT IS) SELECTING SS	DETECT SW REQ. BY WS SD; SL IS OPERATING AT SS; UPDATE T-K1 BYTE	DETECT RR BY RECEIVING K1/K2; SL IS SWITCHED TO SS; UPDATE T-K2 BYTE
	SW REQ. BY STANDBY SD	(ONU IS) SELECTING SS	NO SW REQ.	(OLT IS) SELECTING WS	DETECT SW REQ. BY WS SD; SL IS OPERATING AT SS; UPDATE T-K1 BYTE	DETECT RR BY RECEIVING K1/K2; SL IS SWITCHED TO WS; UPDATE T-K2 BYTE

FIG.4

SIGNAL DEGRADE OCCURS IN SS TX/RX OF ONU	SW REQ. BY STANDBY SD	(ONU IS) SELECTING WS	NO SW REQ.	(OLT IS) SELECTING WS	DETECT RR BY RECEIVING K2; SL IS SWITCHED TO WS; UPDATE T-K2 BYTE	DETECT RR BY RECEIVING K1/K2; SL IS SWITCHED TO WS; UPDATE T-K2 BYTE	~S18
SIGNAL DEGRADE IS RESTORED IN SS TX/RX OF ONU	NO SW REQ.	(ONU IS) SELECTING WS	NO SW REQ.	(OLT IS) SELECTING WS	NO REQ.; UPDATE K1 BYTE	DETECT RR BY RECEIVING K1/K2; SL IS SWITCHED TO WS; UPDATE T-K2 BYTE	~S19

NOTES: WS = WORKING SIDE

SS = STANDBY SIDE

TX/RX = TRANSMITTING AND RECEIVING SECTION

ONU = OPTICAL NETWORK UNIT

OLT = OPTICAL LINE TERMINATION

SW = SWITCH OR SWITCHING

REQ. = REQUEST

SF = SIGNAL FAIL

SD = SIGNAL DEGRADE

T-K1 = TRANSMISSION K1 BYTE

T-K2 = TRANSMISSION K2 BYTE

RR = REMOTE REQUEST

SL = SELECTOR

FIG. 5

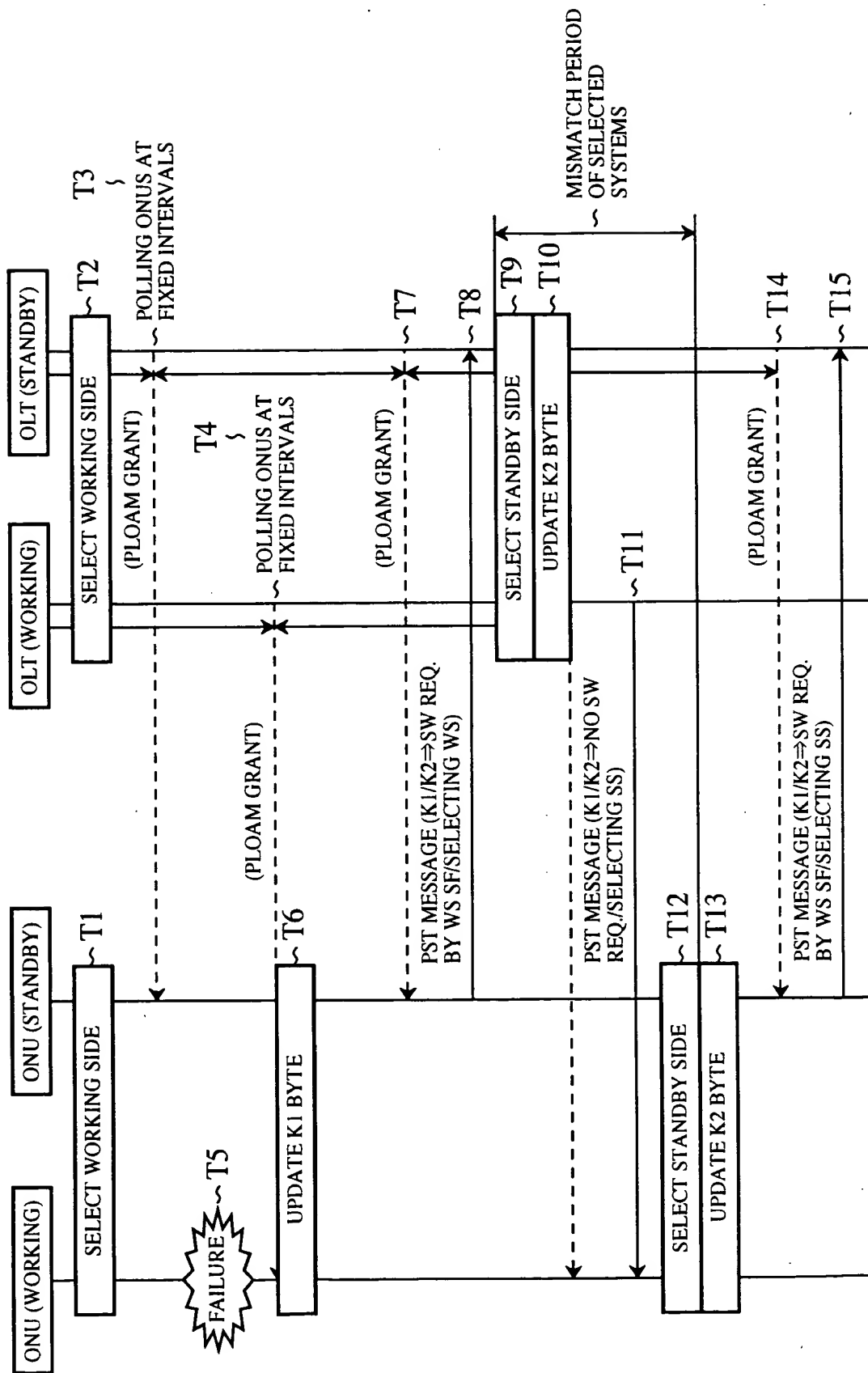
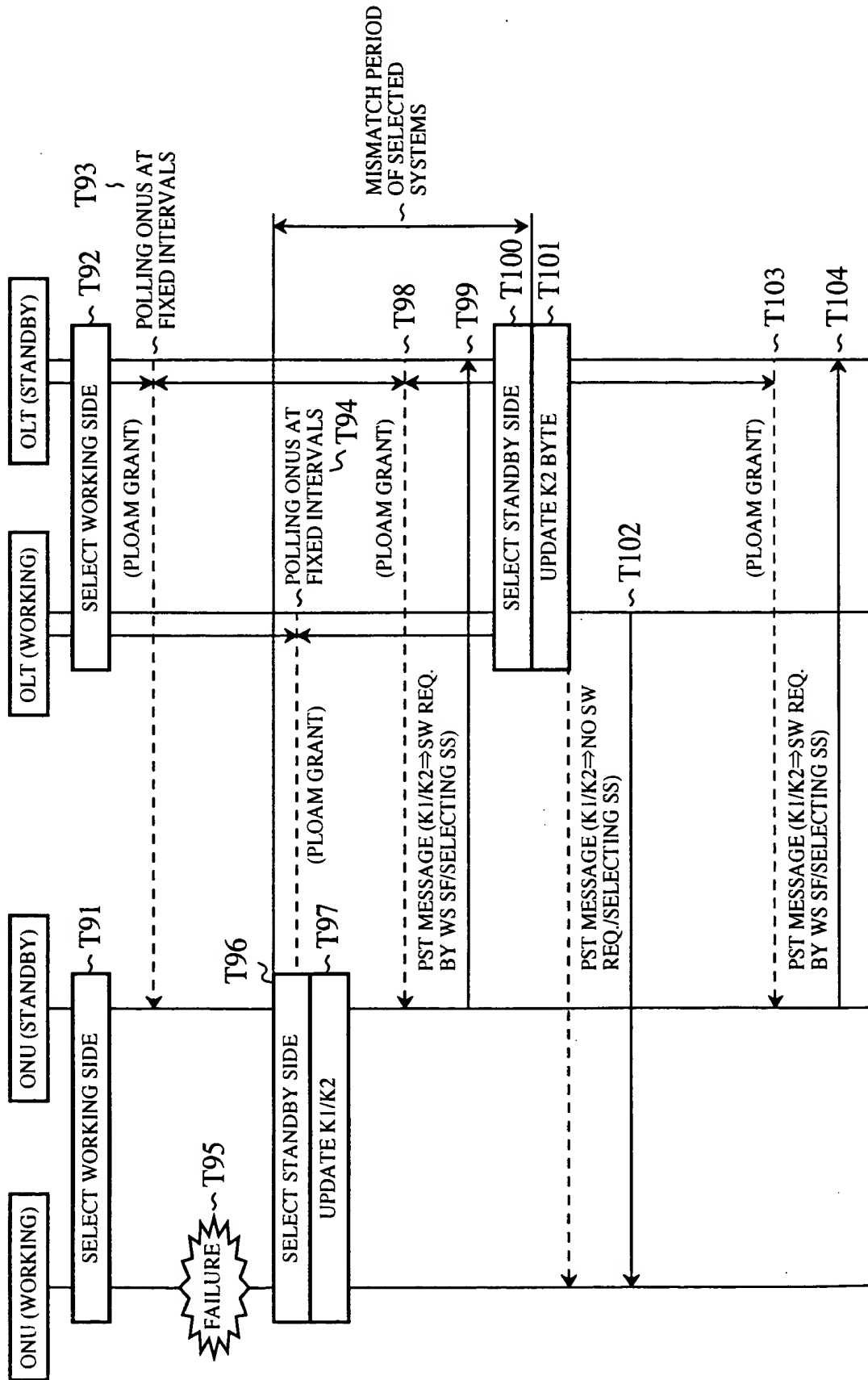


FIG. 6



7/26

FIG. 7

CONTROL EXAMPLE (REVERTIVE MODE)

FAULT STATE	ONU TO OLT		OLT TO ONU		OPERATION	
	K1 BYTE	K2 BYTE	K1 BYTE	K2 BYTE	ONU	OLT
NO FAILURE	NO SW REQ.	(ONU IS) SELECTING WS	NO SW REQ.	(OLT IS) SELECTING WS	SL IS OPERATING IN WS	SL IS WORKING AT WS
EQUIPMENT FAILURE OCCURS IN WS TX/RX OF ONU	SW REQ. BY WORKING SF	(ONU IS) SELECTING WS	NO SW REQ.	(OLT IS) SELECTING WS	DETECT SW REQ. BY WORKING SF; SL IS WORKING AT WS; UPDATE T-K1 BYTE	SL IS WORKING AT WS
	SW REQ. BY WORKING SF	(ONU IS) SELECTING WS	NO SW REQ.	(OLT IS) SELECTING SS	DETECT SW REQ. BY WORKING SF; SL IS WORKING AT WS; UPDATE T-K1 BYTE	DETECT RR BY RECEIVING K1/K2; SL IS SWITCHED TO SS; UPDATE T-K2 BYTE
	SW REQ. BY WORKING SF	(ONU IS) SELECTING SS	NO SW REQ.	(OLT IS) SELECTING SS	DETECT RR BY RECEIVING K2; SL IS SWITCHED TO SS; UPDATE T-K2 BYTE	DETECT RR BY RECEIVING K1/K2; SL IS SWITCHED TO SS; UPDATE T-K2 BYTE
EQUIPMENT FAILURE IS RESTORED IN WS TX/RX OF ONU	REQUESTING TO REVERT TO WS	(ONU IS) SELECTING SS	NO SW REQ.	(OLT IS) SELECTING SS	DETECT SW REQ. CLEAR; WAIT TO REVERT STATE; UPDATE T-K1 BYTE	START RESTORE TIMER; SL IS OPERATING AT SS
REVERSION WAITING EXPIRES AT OLT	WAITING TO REVERT TO WS	(ONU IS) SELECTING SS	NO SW REQ.	(OLT IS) SELECTING WS	DETECT SW REQ. CLEAR; WAIT TO REVERT STATE; UPDATE T-K1 BYTE	STOP RESTORE TIMER; SL IS SWITCHED TO WS; UPDATE T-K2 BYTE
	NO SW REQ.	(ONU IS) SELECTING WS	NO SW REQ.	(OLT IS) SELECTING WS	DETECT RR BY RECEIVING K2; SL IS SWITCHED TO WS; UPDATE K1 BYTE	STOP RESTORE TIMER; SL IS SWITCHED TO WS; UPDATE T-K2 BYTE

S11

S12

S13

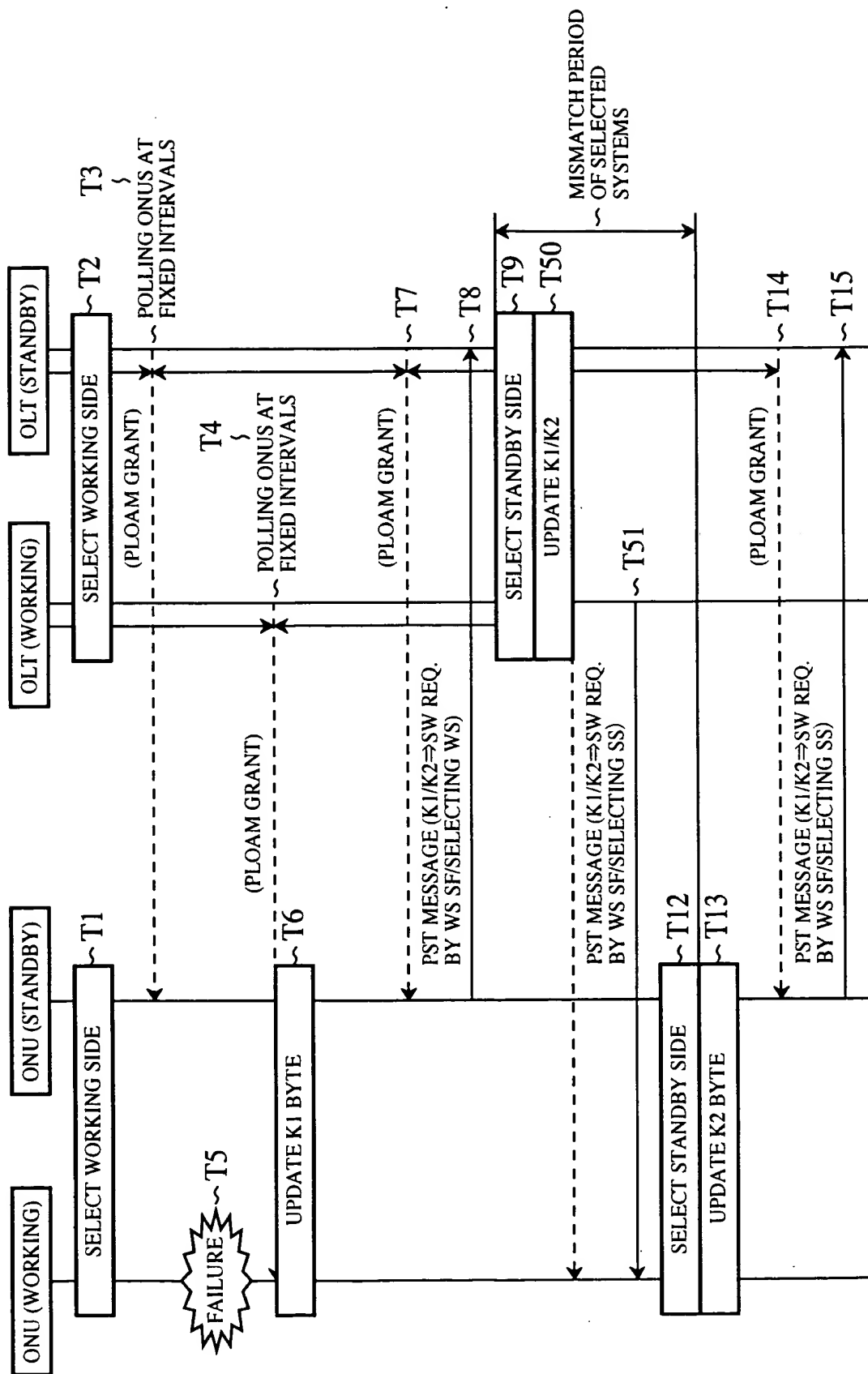
S14

S21

S22

S23

FIG. 8





9/26

FIG. 9

CONTROL EXAMPLE (NON-REVERTIVE MODE)

FAULT STATE	ONU TO OLT		OLT TO ONU		OPERATION	
	K1 BYTE	K2 BYTE	K1 BYTE	K2 BYTE	ONU	OLT
NO FAILURE	NO SW REQ.	(ONU IS) SELECTING WS	NO SW REQ.	(OLT IS) SELECTING WS	SL IS OPERATING IN WS	SL IS WORKING AT WS
EQUIPMENT FAILURE OCCURS IN WS TX/RX OF ONU	SW REQ. BY WORKING SF	(ONU IS) SELECTING WS	NO SW REQ.	(OLT IS) SELECTING WS	DETECT SW REQ. BY WORKING SF; SL IS WORKING AT WS; UPDATE T-K1 BYTE	SL IS WORKING AT WS
	SW REQ. BY WORKING SF	(ONU IS) SELECTING WS	SW REQ. BY WORKING SF	(OLT IS) SELECTING SS	DETECT SW REQ. BY WORKING SF; SL IS WORKING AT WS; UPDATE T-K1 BYTE	DETECT RR BY RECEIVING K1/K2; SL IS SWITCHED TO SS; UPDATE T-K1/K2 BYTES
	SW REQ. BY WORKING SF	(ONU IS) SELECTING SS	SW REQ. BY WORKING SF	(OLT IS) SELECTING SS	DETECT RR BY RECEIVING K1/K2; SL IS SWITCHED TO SS; UPDATE T-K2 BYTE	DETECT RR BY RECEIVING K1/K2; SL IS SWITCHED TO SS; UPDATE T-K1/K2 BYTES
EQUIPMENT FAILURE IS RESTORED IN WS TX/RX OF ONU	DO NOT REVERT TO WS	(ONU IS) SELECTING SS	SW REQ. BY WORKING SF	(OLT IS) SELECTING SS	DETECT SW REQ. CLEAR; UPDATE T-K1 BYTE; DO NOT REVERT STATE	DETECT RR BY RECEIVING K1/K2; SL IS SWITCHED TO SS; UPDATE T-K1/K2 BYTES
	DO NOT REVERT TO WS	(ONU IS) SELECTING SS	DO NOT REVERT TO WS	(OLT IS) SELECTING SS	DETECT SW REQ. CLEAR; UPDATE T-K1 BYTE; DO NOT REVERT STATE	DETECT RR RELEASE BY RECEIVING K1/K2; DO NOT REVERT STATE; UPDATE T-K1 BYTE
SIGNAL DEGRADE OCCURS IN SS TX/RX OF ONU	SW REQ. BY STANDBY SD	(ONU IS) SELECTING SS	DO NOT REVERT TO WS	(OLT IS) SELECTING SS	DETECT SW REQ. BY WS SD; SL IS OPERATING AT SS; UPDATE T-K1 BYTE	DETECT RR RELEASE BY RECEIVING K1/K2; DO NOT REVERT STATE; UPDATE T-K1 BYTE

~S11

~S12

~S13

~S14

~S15

~S15

~S16

10/26

FIG.10

SIGNAL DEGRADE OCCURS IN SS TX/RX OF ONU	SW REQ. BY STANDBY SD	(ONU IS) SELECTING SS	SW REQ. BY STANDBY SD	(OLT IS) SELECTING WS	DETECT SW REQ. BY WS SD; SL IS OPERATING AT SS; UPDATE T-K1 BYTE	DETECT RR BY RECEIVING K1/K2; SL IS SWITCHED TO WS; UPDATE T-K1/K2 BYTES	~S17'
	SW REQ. BY STANDBY SD	(ONU IS) SELECTING WS	SW REQ. BY STANDBY SD	(OLT IS) SELECTING WS	DETECT RR BY RECEIVING K1 AND K2; SL SWITCHED TO WS; UPDATE T-K2 BYTE	DETECT RR BY RECEIVING K1/K2; SL IS SWITCHED TO WS; UPDATE T-K1/K2 BYTES	~S18'
	NO SW REQ.	(ONU IS) SELECTING WS	SW REQ. BY STANDBY SD	(OLT IS) SELECTING WS	NO REQ.; UPDATE K1 BYTE	DETECT RR BY RECEIVING K1/K2; SL IS SWITCHED TO WS; UPDATE T-K1/K2 BYTES	~S19'
SIGNAL DEGRADE IS RESTORED IN SS TX/RX OF ONU	NO SW REQ.	(ONU IS) SELECTING WS	NO SW REQ.	(OLT IS) SELECTING WS	NO REQ.; UPDATE K1 BYTE	NO REQ.; UPDATE K1 BYTE	~S19"

11/26

FIG.11

CONTROL EXAMPLE (REVERTIVE MODE)

FAULT STATE	ONU TO OLT		OLT TO ONU		OPERATION	
	K1 BYTE	K2 BYTE	K1 BYTE	K2 BYTE	ONU	OLT
NO FAILURE	NO SW REQ.	(ONU IS) SELECTING WS	NO SW REQ.	(OLT IS) SELECTING WS	SL IS OPERATING IN WS	SL IS WORKING AT WS
EQUIPMENT FAILURE OCCURS IN WS TX/RX OF ONU	SW REQ. BY WORKING SF	(ONU IS) SELECTING WS	NO SW REQ.	(OLT IS) SELECTING WS	DETECT SW REQ. BY WORKING SF; SL IS WORKING AT WS; UPDATE T-K1 BYTE	SL IS WORKING AT WS
	SW REQ. BY WORKING SF	(ONU IS) SELECTING WS	SW REQ. BY WORKING SF	(OLT IS) SELECTING SS	DETECT SW REQ. BY WORKING SF; SL IS WORKING AT WS; UPDATE T-K1 BYTE	DETECT RR BY RECEIVING K1/K2; SL IS SWITCHED TO SS; UPDATE T-K1/K2 BYTES
	SW REQ. BY WORKING SF	(ONU IS) SELECTING SS	SW REQ. BY WORKING SF	(OLT IS) SELECTING SS	DETECT RR BY RECEIVING K1/K2; SL IS SWITCHED TO SS; UPDATE T-K1/K2 BYTES	DETECT RR BY RECEIVING K1/K2; SL IS SWITCHED TO SS; UPDATE T-K1/K2 BYTES
EQUIPMENT FAILURE IS RESTORED IN WS TX/RX OF ONU	REQUESTING TO REVERT TO WS	(ONU IS) SELECTING SS	SW REQ. BY WORKING SF	(OLT IS) SELECTING SS	DETECT SW REQ. CLEAR; UPDATE T-K1 BYTE	DETECT RR BY RECEIVING K1/K2; SL IS SWITCHED TO SS; UPDATE T-K1/K2 BYTES
	REQUESTING TO REVERT TO WS	(ONU IS) SELECTING SS	REQUESTING TO REVERT TO WS	(OLT IS) SELECTING SS	DETECT SW REQ. CLEAR; UPDATE T-K1 BYTE	DETECT RR RELEASE BY RECEIVING K1/K2; WAIT TO REVERT STATE; START RESTORE TIMER; UPDATE T-K1 BYTE

~S11

~S12

~S13

~S14

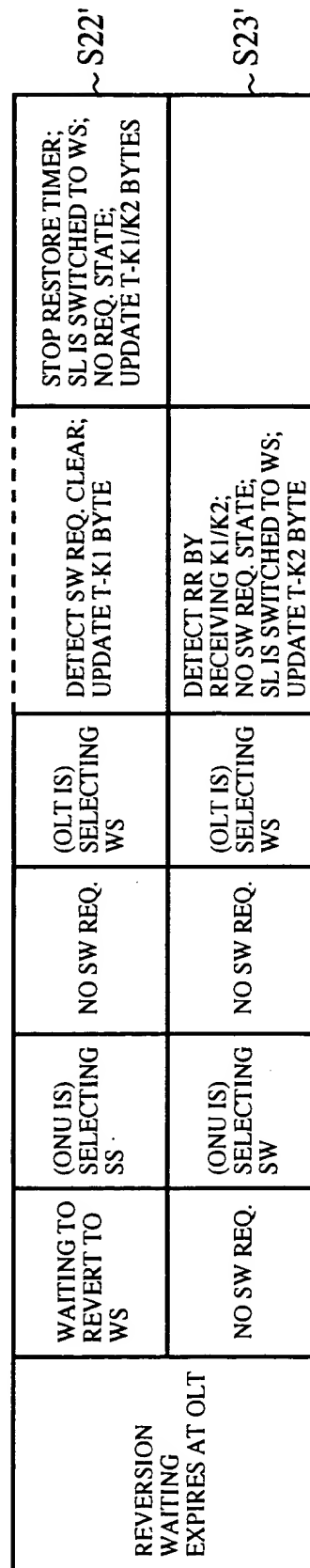
~S21

~S21

FIG.11 29524660

12/26

FIG.12



13/26

FIG.13

FAULT STATE	ONU TO OLT		OLT TO ONU		OPERATION	
	K1 BYTE	K2 BYTE	K1 BYTE	K2 BYTE	ONU	OLT
NO FAILURE	NO SW REQ.	(ONU) ESTABLISHES ITS ROUTE TO WS	NO SW REQ.	(OLT) ESTABLISHES ITS ROUTE TO WS	ROUTER AND SL ARE OPERATING AT WS	ROUTER AND SL ARE OPERATING AT WS
	SW REQ. BY WORKING SF	(ONU) ESTABLISHES ITS ROUTE TO WS	NO SW REQ.	(OLT) ESTABLISHES ITS ROUTE TO WS	DETECT SW REQ. BY WORKING SF; SL IS WORKING AT WS; UPDATE T-K1 BYTE	ROUTER AND SL ARE OPERATING AT WS
	SW REQ. BY WORKING SF	(ONU) ESTABLISHES ITS ROUTE TO WS	ACK	(OLT) ESTABLISHES ITS ROUTE TO SS	DETECT SW REQ. BY WORKING SF; SL IS WORKING AT WS; UPDATE T-K1 BYTE	DETECT RR BY RECEIVING K1/K2 BYTES; ROUTER IS SWITCHED TO SS; UPDATE T-K1/K2 BYTES
EQUIPMENT FAILURE OCCURS IN WS TX/RX OF ONU	SW REQ. BY WORKING SF	(ONU) ESTABLISHES ITS ROUTE TO SS	ACK	(OLT) ESTABLISHES ITS ROUTE TO SS	DETECT RR BY RECEIVING K1/K2 BYTES; SL IS SWITCHED TO SS; ROUTER IS SWITCHED TO SS; UPDATE T-K2 BYTE	DETECT RR BY RECEIVING K1/K2 BYTES; ROUTER IS SWITCHED TO SS; UPDATE T-K1/K2 BYTES
	SW REQ. BY WORKING SF	(ONU) ESTABLISHES ITS ROUTE TO SS	ACK	(OLT) ESTABLISHES ITS ROUTE TO SS	DETECT RR BY RECEIVING K1/K2 BYTES; SL IS SWITCHED TO SS; ROUTER IS SWITCHED TO SS; UPDATE T-K2 BYTE	DETECT RR BY RECEIVING K1/K2 BYTES; SL IS SWITCHED TO SS
	DO NOT REVERT TO WS	(ONU) ESTABLISHES ITS ROUTE TO SS	ACK	(OLT) ESTABLISHES ITS ROUTE TO SS	DETECT SW REQ. CLEAR; DO NOT REVERT STATE; UPDATE T-K1 BYTE	DETECT RR BY RECEIVING K1/K2 BYTES; SL IS SWITCHED TO SS

~S31

~S32

~S33

~S34

~S35

~S36

FIG. 13

FIG.14

SIGNAL DEGRADE OCCURS IN SS TX/RX OF ONU	SW REQ. BY STANDBY SD	(ONU) ESTABLISHES ITS ROUTE TO SS	NO SW REQ.	(OLT) ESTABLISHES ITS ROUTE TO SS	DETECT SW REQ. BY WS SD; SL IS OPERATING AT SS; UPDATE T-K1 BYTE	DETECT RR BY RECEIVING K1/K2 BYTES; SL IS SWITCHED TO SS	~S37
	SW REQ. BY STANDBY SD	((ONU) ESTABLISHES ITS ROUTE TO SS	ACK	(OLT) ESTABLISHES ITS ROUTE TO WS	DETECT SW REQ. BY WS SD; SL IS OPERATING AT SS; UPDATE T-K1 BYTE	DETECT RR BY RECEIVING K1/K2 BYTES; ROUTER IS SWITCHED TO SS; UPDATE T-K1/K2 BYTES	~S38
	SW REQ. BY STANDBY SD	(ONU) ESTABLISHES ITS ROUTE TO WS	ACK	(OLT) ESTABLISHES ITS ROUTE TO WS	DETECT RR BY RECEIVING K1/K2 BYTES; SL IS SWITCHED TO SS; ROUTER IS SWITCHED TO SS; UPDATE T-K2 BYTE	DETECT RR BY RECEIVING K1/K2 BYTES; ROUTER IS SWITCHED TO SS; UPDATE T-K1/K2 BYTES	~S39
	SW REQ. BY STANDBY SD	(ONU) ESTABLISHES ITS ROUTE TO WS	ACK	(OLT) ESTABLISHES ITS ROUTE TO WS	DETECT RR BY RECEIVING K1/K2 BYTES; SL IS SWITCHED TO SS; ROUTER IS SWITCHED TO SS; UPDATE T-K2 BYTE	DETECT RR BY RECEIVING K1/K2 BYTES; SL IS SWITCHED TO SS	~S40
SIGNAL DEGRADE IS RESTORED IN SS TX/RX OF ONU	NO SW REQ.	(ONU) ESTABLISHES ITS ROUTE TO WS	ACK	(OLT) ESTABLISHES ITS ROUTE TO WS	NO REQ.; UPDATE K1 BYTE	DETECT RR BY RECEIVING K1/K2 BYTES; SL IS SWITCHED TO SS	~S41
	NO SW REQ.	(ONU) ESTABLISHES ITS ROUTE TO WS	NO SW REQ.	(OLT) ESTABLISHES ITS ROUTE TO WS	NO REQ.; UPDATE K1 BYTE	NO REQ.; UPDATE K1 BYTE	~S42

FIG.15

FAULT STATE	ONU TO OLT		OLT TO ONU		OPERATION	
	K1 BYTE	K2 BYTE	K1 BYTE	K2 BYTE	ONU	OLT
NO FAILURE	NO SW REQ.	(ONU) ESTABLISHES ITS ROUTE TO WS	NO SW REQ.	(OLT) ESTABLISHES ITS ROUTE TO WS	ROUTER AND SL ARE OPERATING AT WS	ROUTER AND SL ARE OPERATING AT WS
	SW REQ. BY WORKING SF	(ONU) ESTABLISHES ITS ROUTE TO WS	NO SW REQ.	(OLT) ESTABLISHES ITS ROUTE TO WS	DETECT SW REQ. BY WORKING SF; SL IS WORKING AT WS; UPDATE T-K1 BYTE	ROUTER AND SL ARE OPERATING AT WS
	SW REQ. BY WORKING SF	(ONU) ESTABLISHES ITS ROUTE TO WS	ACK	(OLT) ESTABLISHES ITS ROUTE TO SS	DETECT SW REQ. BY WORKING SF; SL IS WORKING AT WS; UPDATE T-K1 BYTE	DETECT RR BY RECEIVING K1/K2 BYTES; ROUTER IS SWITCHED TO SS; UPDATE T-K1/K2 BYTES
	SW REQ. BY WORKING SF	(ONU) ESTABLISHES ITS ROUTE TO SS	ACK	(OLT) ESTABLISHES ITS ROUTE TO SS	DETECT RR BY RECEIVING K1/K2 BYTES; SL IS SWITCHED TO SS; ROUTER IS SWITCHED TO SS; UPDATE T-K2 BYTE	DETECT RR BY RECEIVING K1/K2 BYTES; ROUTER IS SWITCHED TO SS; UPDATE T-K1/K2 BYTES
EQUIPMENT FAILURE OCCURS IN WS TX/RX OF ONU	SW REQ. BY WORKING SF	(ONU) ESTABLISHES ITS ROUTE TO SS	ACK	(OLT) ESTABLISHES ITS ROUTE TO SS	DETECT RR BY RECEIVING K1/K2 BYTES; SL IS SWITCHED TO SS; ROUTER IS SWITCHED TO SS; UPDATE T-K2 BYTE	DETECT RR BY RECEIVING K1/K2 BYTES; SL IS SWITCHED TO SS
	REQUESTING TO REVERT TO WS	(ONU) ESTABLISHES ITS ROUTE TO WS	ACK	(OLT) ESTABLISHES ITS ROUTE TO SS	DETECT SW REQ. CLEAR; WAIT TO REVERT STATE; UPDATE T-K1 BYTE	START RESTORE TIMER; SL IS OPERATING AT SS
EQUIPMENT FAILURE IS RESTORED IN WS TX/RX OF ONU						

FIG. 16

REVERSION WAITING EXPIRES AT OLT	WAITING TO REVERT TO WS	(ONU) ESTABLISHES ITS ROUTE TO SS	NO SW REQ.	(OLT) ESTABLISHES ITS ROUTE TO WS	DETECT SW REQ. CLEAR; WAIT TO REVERT STATE; UPDATE T-K1 BYTE	S52 STOP RESTORE TIMER; ROUTER IS SWITCHED TO WS; NO SW REQ. STATE; UPDATE T-K1/K2 BYTES
	NO SW REQ.	(ONU) ESTABLISHES ITS ROUTE TO WS	NO SW REQ.	(OLT) ESTABLISHES ITS ROUTE TO WS	DETECT RR BY RECEIVING K1/K2 BYTES; SL IS SWITCHED TO WS; ROUTER IS SWITCHED TO WS; UPDATE T-K1/K2 BYTES	S53 STOP RESTORE TIMER; ROUTER IS SWITCHED TO WS; NO SW REQ. STATE; UPDATE T-K1/K2 BYTES
	NO SW REQ.	(ONU) ESTABLISHES ITS ROUTE TO WS	NO SW REQ.	(OLT) ESTABLISHES ITS ROUTE TO WS	DETECT RR BY RECEIVING K1/K2 BYTES; SL IS SWITCHED TO WS; ROUTER IS SWITCHED TO WS; UPDATE T-K1/K2 BYTES	S54 DETECT RR BY RECEIVING K1/K2 BYTES; SL IS SWITCHED TO WS



FIG. 17

FAULT STATE	ONU TO OLT		OLT TO ONU		OPERATION	
	K1 BYTE	K2 BYTE	K1 BYTE	K2 BYTE	ONU	OLT
NO FAILURE	NO SW REQ.	(ONU) ESTABLISHES ITS ROUTE TO WS	NO SW REQ.	(OLT) ESTABLISHES ITS ROUTE TO WS	ROUTER AND SL ARE OPERATING AT WS	ROUTER AND SL ARE OPERATING AT WS
	SW REQ. BY WORKING SF	(ONU) ESTABLISHES ITS ROUTE TO WS	NO SW REQ.	(OLT) ESTABLISHES ITS ROUTE TO WS	DETECT SW REQ. BY WORKING SF; SL IS WORKING AT WS; UPDATE T-K1 BYTE	ROUTER AND SL ARE OPERATING AT WS
	SW REQ. BY WORKING SF	(ONU) ESTABLISHES ITS ROUTE TO WS	ACK	(OLT) ESTABLISHES ITS ROUTE TO SS	DETECT SW REQ. BY WORKING SF; SL IS WORKING AT WS; UPDATE T-K1 BYTE	DETECT RR BY RECEIVING K1/K2 BYTES; ROUTER IS SWITCHED TO SS; UPDATE T-K1/K2 BYTES
EQUIPMENT FAILURE OCCURS IN WS TX/RX OF ONU	SW REQ. BY WORKING SF	(ONU) ESTABLISHES ITS ROUTE TO SS	ACK	(OLT) ESTABLISHES ITS ROUTE TO SS	DETECT RR BY RECEIVING K1/K2 BYTES; SL IS SWITCHED TO SS; ROUTER IS SWITCHED TO SS; UPDATE T-K2 BYTE	DETECT RR BY RECEIVING K1/K2 BYTES; ROUTER IS SWITCHED TO SS; UPDATE T-K1/K2 BYTES
	SW REQ. BY WORKING SF	(ONU) ESTABLISHES ITS ROUTE TO SS	ACK	(OLT) ESTABLISHES ITS ROUTE TO SS	DETECT RR BY RECEIVING K1/K2 BYTES; SL IS SWITCHED TO SS; ROUTER IS SWITCHED TO SS; UPDATE T-K2 BYTE	DETECT RR BY RECEIVING K1/K2 BYTES; SL IS SWITCHED TO SS
	DO NOT REVERT TO WS	(ONU) ESTABLISHES ITS ROUTE TO SS	ACK	(OLT) ESTABLISHES ITS ROUTE TO SS	DETECT SW REQ. CLEAR; DO NOT REVERT STATE; UPDATE T-K1 BYTE	DETECT RR BY RECEIVING K1/K2 BYTES; DO NOT REVERT STATE; UPDATE T-K1 BYTE
EQUIPMENT FAILURE IS RESTORED IN WS TX/RX OF ONU	DO NOT REVERT TO WS	(ONU) ESTABLISHES ITS ROUTE TO SS	DO NOT REVERT TO WS	(OLT) ESTABLISHES ITS ROUTE TO SS	DETECT SW REQ. CLEAR; DO NOT REVERT STATE; UPDATE T-K1 BYTE	DETECT RR RELEASE BY RECEIVING K1/K2 BYTES; DO NOT REVERT STATE; UPDATE T-K1 BYTE

18/26

FIG.18

SIGNAL DEGRADE OCCURS IN SS TX/RX OF ONU	SW REQ. BY STANDBY SD	(ONU) ESTABLISHES ITS ROUTE TO SS	DO NOT REVERT TO WS	(OLT) ESTABLISHES ITS ROUTE TO SS	DETECT SW REQ. BY STANDBY SD; SL IS OPERATING AT SS; UPDATE T-K1 BYTE	DETECT RR RELEASE BY RECEIVING K1/K2 BYTES; DO NOT REVERT STATE; UPDATE T-K1 BYTE	~S37
	SW REQ. BY STANDBY SD	((ONU) ESTABLISHES ITS ROUTE TO SS	ACK	(OLT) ESTABLISHES ITS ROUTE TO WS	DETECT SW REQ. BY STANDBY SD; SL IS OPERATING AT SS; UPDATE T-K1 BYTE	DETECT RR BY RECEIVING K1/K2 BYTES; ROUTER IS SWITCHED TO SS; UPDATE T-K1/K2 BYTES	~S38
	SW REQ. BY STANDBY SD	(ONU) ESTABLISHES ITS ROUTE TO WS	ACK	(OLT) ESTABLISHES ITS ROUTE TO WS	DETECT RR BY RECEIVING K1/K2 BYTES; SL IS SWITCHED TO SS; ROUTER IS SWITCHED TO SS; UPDATE T-K2 BYTE	DETECT RR BY RECEIVING K1/K2 BYTES; ROUTER IS SWITCHED TO SS; UPDATE T-K1/K2 BYTES	~S39
	SW REQ. BY STANDBY SD	(ONU) ESTABLISHES ITS ROUTE TO WS	ACK	(OLT) ESTABLISHES ITS ROUTE TO WS	DETECT RR BY RECEIVING K1/K2 BYTES; SL IS SWITCHED TO SS; ROUTER IS SWITCHED TO SS; UPDATE T-K2 BYTE	DETECT RR BY RECEIVING K1/K2 BYTES; SL IS SWITCHED TO SS	~S40
SIGNAL DEGRADE IS RESTORED IN SS TX/RX OF ONU	NO SW REQ.	(ONU) ESTABLISHES ITS ROUTE TO WS	ACK	(OLT) ESTABLISHES ITS ROUTE TO WS	NO REQ.; UPDATE K1 BYTE	DETECT RR BY RECEIVING K1/K2 BYTES; SL IS SWITCHED TO SS	~S41
	NO SW REQ.	(ONU) ESTABLISHES ITS ROUTE TO WS	NO SW REQ.	(OLT) ESTABLISHES ITS ROUTE TO WS	NO REQ.; UPDATE K1 BYTE	NO REQ.; UPDATE K1 BYTE	~S42

FIG. 19

FAULT STATE	ONU TO OLT		OLT TO ONU		OPERATION	
	K1 BYTE	K2 BYTE	K1 BYTE	K2 BYTE	ONU	OLT
NO FAILURE	NO SW REQ.	(ONU) ESTABLISHES ITS ROUTE TO WS	NO SW REQ.	(OLT) ESTABLISHES ITS ROUTE TO WS	ROUTER AND SL ARE OPERATING AT WS	ROUTER AND SL ARE OPERATING AT WS
	SW REQ. BY WORKING SF	(ONU) ESTABLISHES ITS ROUTE TO WS	NO SW REQ.	(OLT) ESTABLISHES ITS ROUTE TO WS	DETECT SW REQ. BY WORKING SF; SL IS WORKING AT WS; UPDATE T-K1 BYTE	ROUTER AND SL ARE OPERATING AT WS
	SW REQ. BY WORKING SF	(ONU) ESTABLISHES ITS ROUTE TO WS	ACK	(OLT) ESTABLISHES ITS ROUTE TO SS	DETECT SW REQ. BY WORKING SF; SL IS WORKING AT WS; UPDATE T-K1 BYTE	DETECT RR BY RECEIVING K1/K2 BYTES; ROUTER IS SWITCHED TO SS; UPDATE T-K1/K2 BYTES
EQUIPMENT FAILURE OCCURS IN WS TX/RX OF ONU	SW REQ. BY WORKING SF	(ONU) ESTABLISHES ITS ROUTE TO SS	ACK	(OLT) ESTABLISHES ITS ROUTE TO SS	DETECT RR BY RECEIVING K1/K2 BYTES; SL IS SWITCHED TO SS; ROUTER IS SWITCHED TO SS; UPDATE T-K2 BYTE	DETECT RR BY RECEIVING K1/K2 BYTES; ROUTER IS SWITCHED TO SS; UPDATE T-K1/K2 BYTES
	SW REQ. BY WORKING SF	(ONU) ESTABLISHES ITS ROUTE TO SS	ACK	(OLT) ESTABLISHES ITS ROUTE TO SS	DETECT RR BY RECEIVING K1/K2 BYTES; SL IS SWITCHED TO SS; ROUTER IS SWITCHED TO SS; UPDATE T-K2 BYTE	DETECT RR BY RECEIVING K1/K2 BYTES; SL IS SWITCHED TO SS
	REQUESTING TO REVERT TO WS.	(ONU) ESTABLISHES ITS ROUTE TO SS	ACK	(OLT) ESTABLISHES ITS ROUTE TO SS	DETECT SW REQ. CLEAR; WAIT TO REVERT STATE; UPDATE T-K1 BYTE	DETECT RR BY RECEIVING K1/K2 BYTES; SL IS SWITCHED TO SS
EQUIPMENT FAILURE IN WS RX OF ONU IS RESTORED	REQUESTING TO REVERT TO WS.	(ONU) ESTABLISHES ITS ROUTE TO SS	REQUESTING TO REVERT TO WS	(OLT) ESTABLISHES ITS ROUTE TO SS	DETECT SW REQ. CLEAR; WAIT TO REVERT STATE; UPDATE T-K1 BYTE	DETECT RR RELEASE BY RECEIVING K1/K2 BYTES; WAIT TO REVERT STATE; START RESTORE TIMER; UPDATE T-K1 BYTE

FIG.20

REVERSION WAITING EXPIRES AT OLT	WAITING TO REVERT TO WS	(ONU) ESTABLISHES ITS ROUTE TO SS	NO SW REQ.	(OLT) ESTABLISHES ITS ROUTE TO WS	DETECT SW REQ. CLEAR; WAIT TO REVERT STATE; UPDATE T-K1 BYTE	STOP RESTORE TIMER; ROUTER IS SWITCHED TO WS; NO SW REQ. STATE; UPDATE T-K1/K2 BYTES	S52
	NO SW REQ.	(ONU) ESTABLISHES ITS ROUTE TO WS	NO SW REQ.	(OLT) ESTABLISHES ITS ROUTE TO WS	DETECT RR BY RECEIVING K1/K2 BYTES; SL IS SWITCHED TO WS; ROUTER IS SWITCHED TO WS; UPDATE T-K1/K2 BYTES	STOP RESTORE TIMER; ROUTER IS SWITCHED TO WS; NO SW REQ. STATE; UPDATE T-K1/K2 BYTES	S53
	NO SW REQ.	(ONU) ESTABLISHES ITS ROUTE TO WS	NO SW REQ.	(OLT) ESTABLISHES ITS ROUTE TO WS	DETECT RR BY RECEIVING K1/K2 BYTES; SL IS SWITCHED TO WS; ROUTER IS SWITCHED TO WS; UPDATE T-K1/K2 BYTES	DETECT RR BY RECEIVING K1/K2 BYTES; SL IS SWITCHED TO WS	S54

21/26

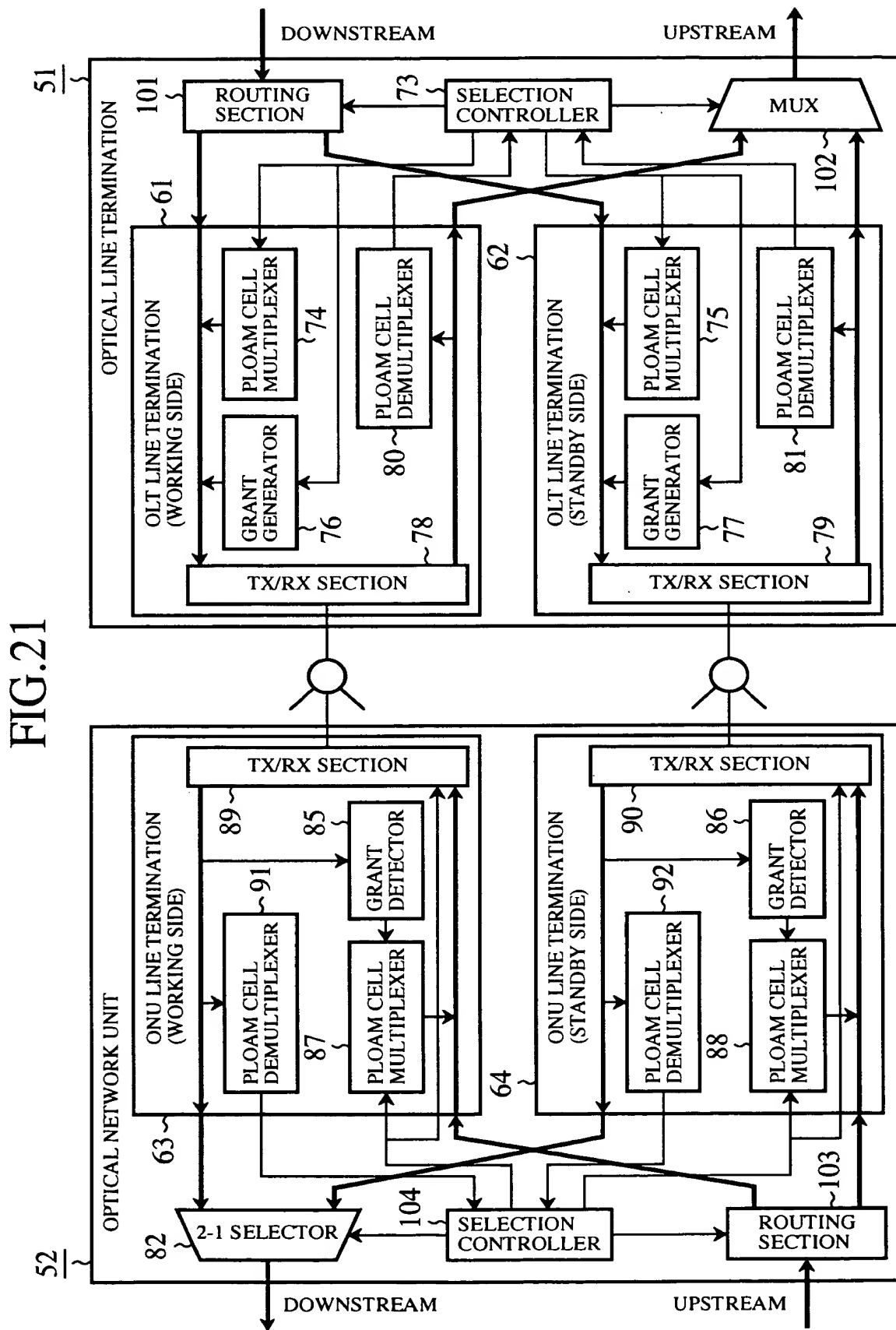


FIG. 21

22/26

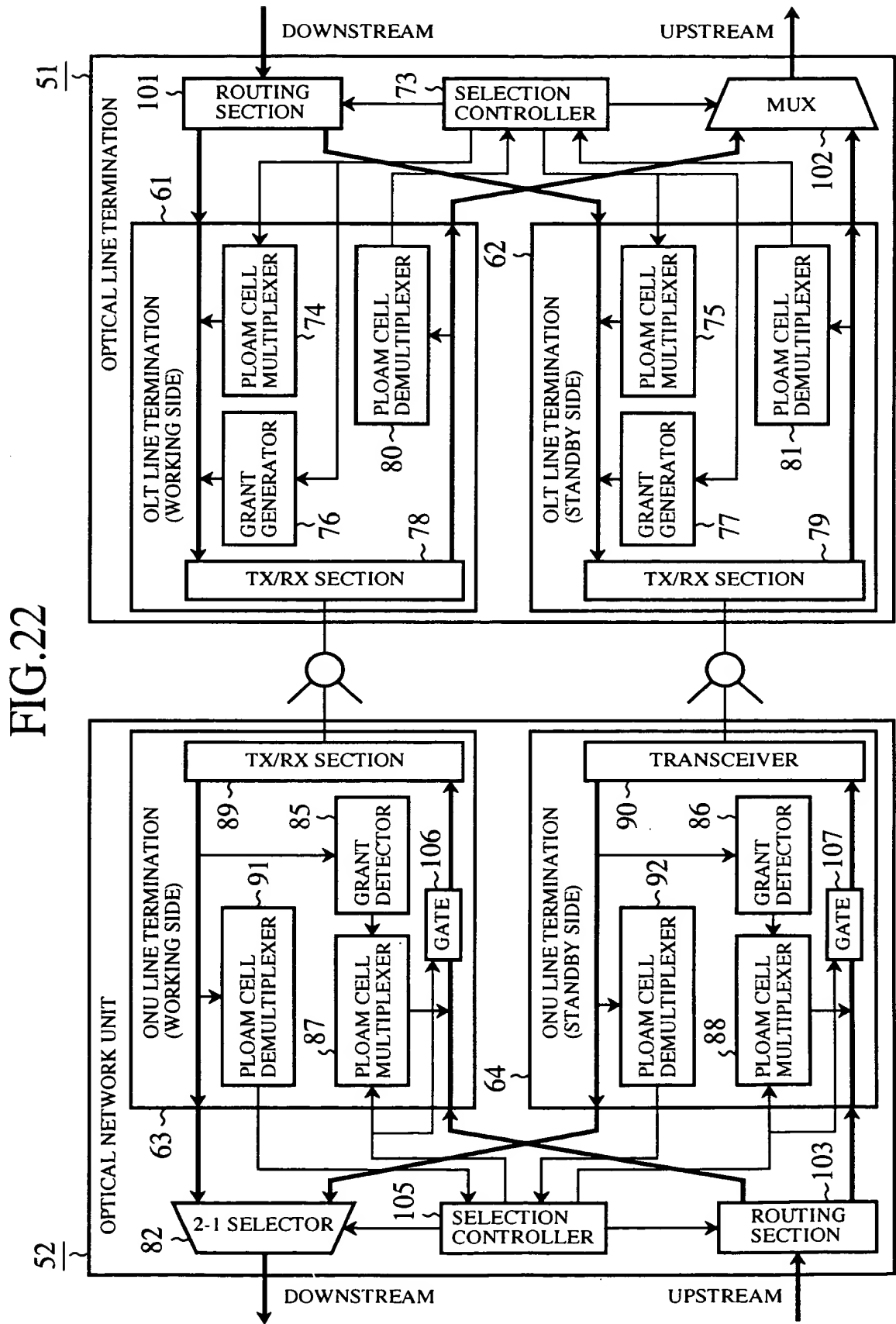


FIG.22

FIG. 22

23/26

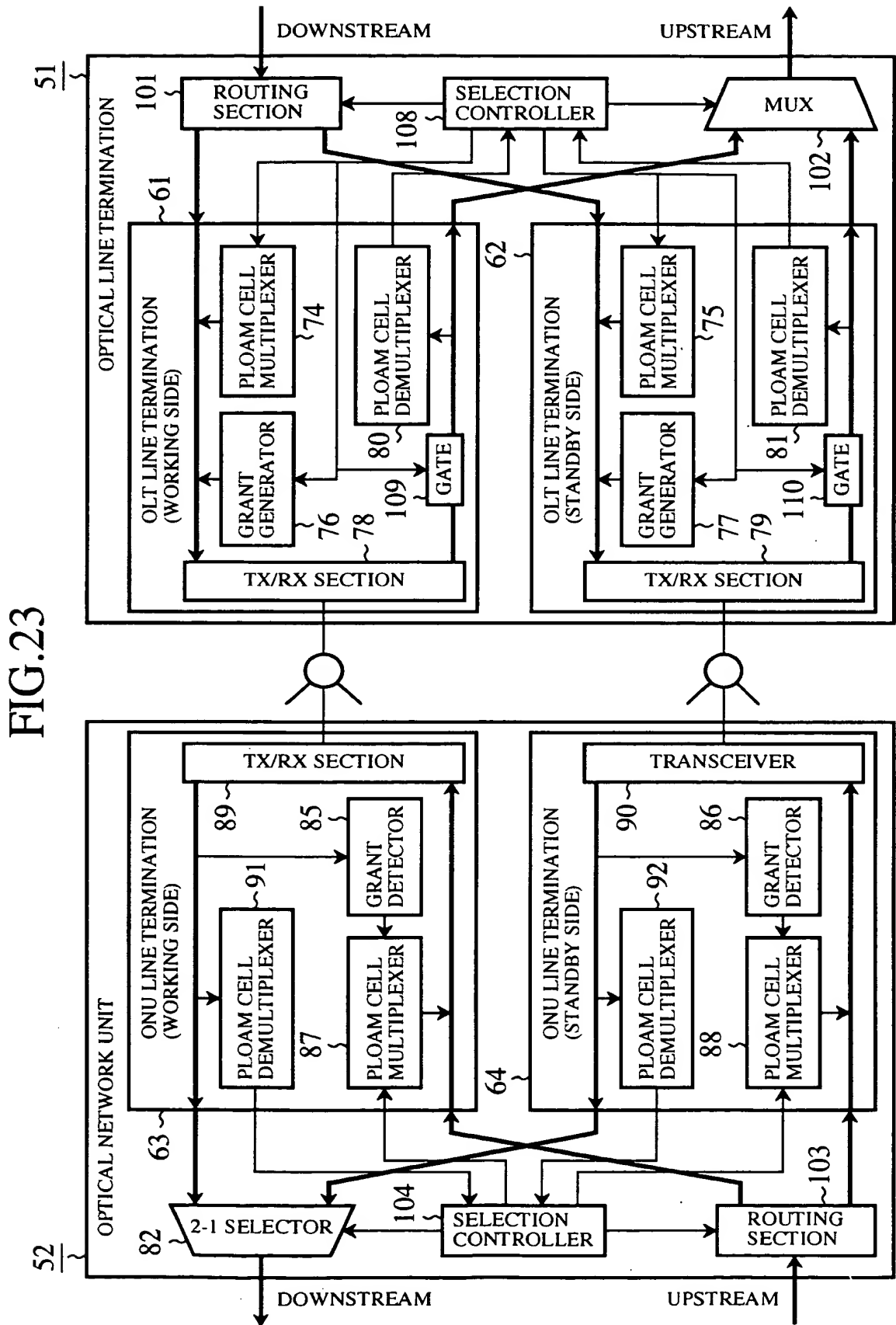
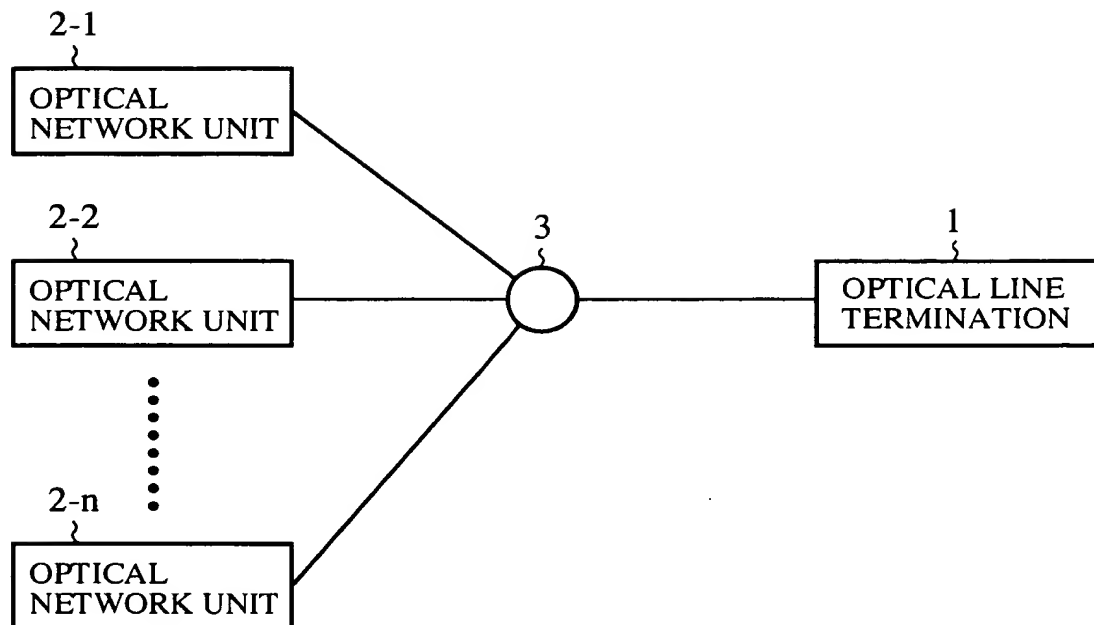


FIG.23

FIG.23

FIG.24 (PRIOR ART)



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25/26

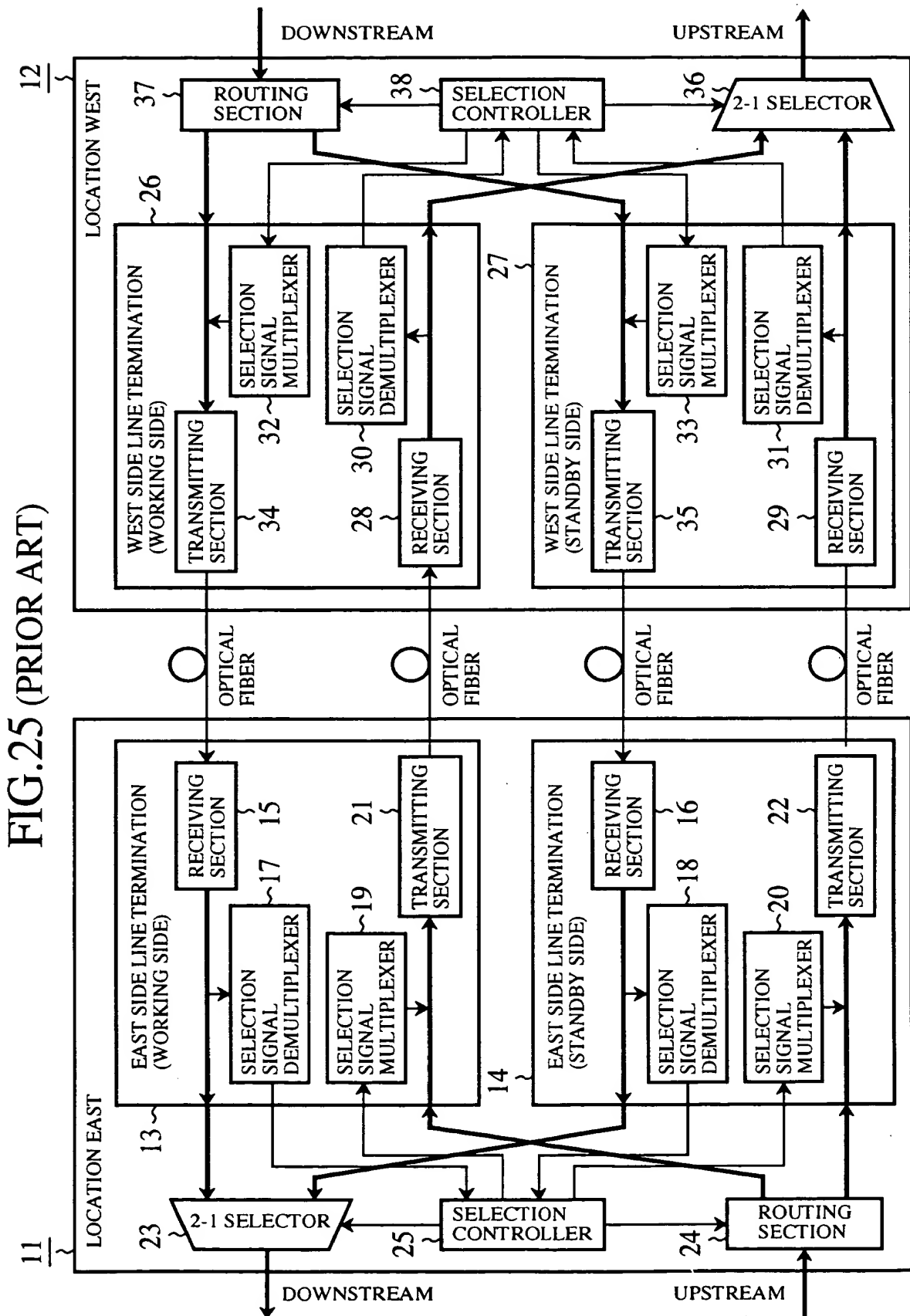


FIG.26 (PRIOR ART)

CONTROL EXAMPLE (NON-REVERTIVE MODE)

FAULT STATE	LE TO LW		LW TO LE		OPERATION	
	K1 BYTE	K2 BYTE	K1 BYTE	K2 BYTE	LE	LW
NO FAILURE	NO SW REQ.	(LE IS) SELECTING WS	NO SW REQ.	(LW IS) SELECTING WS	SL IS OPERATING IN WS	SL IS OPERATING IN WS
EQUIPMENT FAILURE OCCURS IN WS RX OF LE	SW REQ. BY WORKING SF	(LE IS) SELECTING SS	NO SW REQ.	(LW IS) SELECTING WS	DETECT SW REQ. BY WORKING SF; SL IS SWITCHED TO SS; UPDATE T-K1/K2 BYTES	SL IS OPERATING IN WS
	SW REQ. BY WORKING SF	(LE IS) SELECTING SS	NO SW REQ.	(LW IS) SELECTING SS	DETECT SW REQ. BY WORKING SF; SL IS SWITCHED TO SS; UPDATE T-K1/K2 BYTES	DETECT RR BY RECEIVING K1/K2; SL IS SWITCHED TO SS; UPDATE T-K2 BYTE
EQUIPMENT FAILURE IS RESTORED IN WS RX OF LE	DO NOT REVERT TO WS	(LE IS) SELECTING SS	NO SW REQ.	(LW IS) SELECTING SS	DETECT SW REQ. CLEAR; DO NOT REVERT STATE; UPDATE T-K1 BYTE	DETECT RR BY RECEIVING K1/K2; SL IS SWITCHED TO SS; UPDATE T-K2 BYTE
	SW REQ. BY STANDBY SD	(LE IS) SELECTING WS	NO SW REQ.	(LW IS) SELECTING SS	DETECT SW REQ. BY WORKING SD; SL IS SWITCHED TO WS; UPDATE T-K1/K2 BYTES	DETECT RR BY RECEIVING K1/K2; SL IS SWITCHED TO SS; UPDATE T-K2 BYTE
SIGNAL DEGRADE OCCURS IN SS RX OF LE	SW REQ. BY STANDBY SD	(LE IS) SELECTING WS	NO SW REQ.	(LW IS) SELECTING WS	DETECT SW REQ. BY WORKING SD; SL IS SWITCHED TO WS; UPDATE T-K1/K2 BYTES	DETECT RR BY RECEIVING K1/K2; SL IS SWITCHED TO WS; UPDATE T-K2 BYTE
	NO SW REQ.	(LE IS) SELECTING WS	NO SW REQ.	(LW IS) SELECTING WS	NO REQ.; UPDATE K1 BYTE	DETECT RR BY RECEIVING K1/K2; SL IS SWITCHED TO WS; UPDATE T-K2 BYTE

NOTE: LE=LOCATION EAST; LW=LOCATION WEST